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## **ABSTRACT**

A materials system or dielectric structure, for example a photonic crystal, of the invention includes a plurality of materials that are biocompatible. The materials have different indices of refraction for the wavelength of operation and are assembled into a dielectric structure having a photonic band gap in one or more directions. The assembly process yields a structure with a particular spatial arrangement of materials with different indices of refraction which is completely biocompatible and has the property of reflecting light at a particular predetermined range of frequencies, as well as other properties associated with photonic band gaps. These structures can exhibit photonic band gaps that can be engineered to be broad or narrow and be centered on different parts of the spectrum UV, visible IR or longer wavelengths. The materials used can have microwave transparency or be made to reflect microwaves. Possible applications include edible reflectors for visible to impart a particular color to the food or specular appearance, heat shields to minimize radiative and evaporative and convective heat losses, and as a UV protection layer.